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NPTEL

Courses » Heat Treatment and Surface Hardening-I

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Unit 8 - Week-7

Course outline

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  ○ Avrami Kinetics-I

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  ○ Avrami Kinetics-III

  ○ Time-Temperature-Transformation (TTT) diagram

  ○ Diffusion in Solids-I

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Week-8

Assignment 7

The due date for submitting this assignment has passed. **Due on 2018-03-28, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Ravi performed an experiment related to heat treatment of steel. He found that 20 % of **1 point** austenite was transformed into pearlite in 10 minutes whereas 25 minutes were required for 70% transformation of austenite. If it is assumed that kinetics of transformation of austenite to pearlite follows the Avrami equation $y = 1-\exp(-kt^n)$. The value of exponent 'n' will be

   ○ 0.5
   ○ 1.8
   ○ 3.1
   ○ 4.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.8

2) In question no. 1, the value of constant 'k' will be   **1 point**

   ○ 3.3×10^{-3}
   ○ 2.3×10^{-4}
   ○ 8.9×10^{-2}
   ○ 4.6×10^{-5}

No, the answer is incorrect.
Score: 0

Accepted Answers:
3.3×10^{-3}

3) In question no. 1, the total time (minutes) required to transform 90% of austenite in to pearlite **1 point** will be

   ○ 30.1
   ○ 35.7
   ○ 42.1
   ○ 47.3

No, the answer is incorrect.
Score: 0

Accepted Answers:
35.7

4) In Avrami equation $y = 1-\exp(-kt^n)$, the expression for fraction transformed corresponding to maximum rate of transformation will be   **1 point**

○ f = 1 – exp(- (n-1)/n)
○ f = 1 – exp(- (n-1)/2n)
○ f = 1 + exp(- (n-2)/n)
○ f = 1 – exp(- (2n-1)/n)

No, the answer is incorrect.
Score: 0

Accepted Answers:
f = 1 – exp(- (n-1)/n)

5) In Avrami equation y = 1-exp (-kt^n), the constant 'k' and exponent 'n' are 4 x 10^{-6} and 3, **1 point** respectively. The fraction transformed corresponding to maximum rate of transformation will be

○ 0.38
○ 0.59
○ 0.28
○ 0.49

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.49

6) For some transformation having kinetics that obey the Avrami equation [y= 1-   **1 point** exp(-kt^n)], the parameter *n* is known to have a value of 1.5. If, after 125 s, the reaction is 25% complete, total time for the transformation to get 90% completed will be

○ 420 s
○ 510 s
○ 630 s
○ 370 s

No, the answer is incorrect.
Score: 0

Accepted Answers:
510 s

7) If a hypereutectoid steel sample is heated to 1000°C in a furnace and then continuously **1 point** cooled in air to room temperature then the microstructure obtained will be

○ Pearlite + Bainite
○ Pearlite + Martensite
○ Pearlite + Cementite
○ Pearlite +Ferrite

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pearlite + Cementite

8) During diffusion controlled growth, if the growth rate is G at time *t*, then at time   **1 point** *4t*, the growth rate will be _____ times G

○ 0.25
○ 0.50
○ 0.75
○ 0.90

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.50

9) During interface controlled growth, with increase in the degree of   *1 point*
undercooling the growth rate

○ Always increases
○ Always decreases
○ First increases then decreases
○ First decreases then increases

No, the answer is incorrect.
Score: 0

Accepted Answers:
First increases then decreases

10) During heat treatment, due to increase in the cooling rate after heating to the *1 point*
same temperature, the hardness will

○ increase
○ decrease
○ remains constant
○ can not be decided

No, the answer is incorrect.
Score: 0

Accepted Answers:
increase

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